



# Javier LOPEZ-GOMEZ

## HPC/low-level Software Engineer

Madrid, Spain

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### 👤 | Professional Profile

Experienced HPC and low-level C/C++ software engineer with expertise in Operating System internals, Microcontroller firmware, and Compiler design / implementation. Highly motivated, fast learner. Enjoys the development of complex software systems where efficiency matters.

### 💬 | Languages

Spanish Native

English C1

German A1

French A1

### 🔧 | Skills

Compiler Design / LLVM / clang	●●●●●	C/C++	●●●●●
Debugging (gdb, lldb) / Reverse Engineering / Assembly	●●●●●	Python / bash / AWK	●●●●●
OS Architecture / Linux kernel	●●●●●	GTK+ / Xlib	●●●●●
Embedded / Microcontroller-based Systems	●●●●●	MPI	●●●●●
Software and Network Security / TCP/IP stack	●●●●●	Win32 API	●●●●●
Technical Writing / Presentation	●●●●●	Git internals	●●●●●

### 📁 | Experience

- 2020–2023 ○ **Senior Applied Fellow (Software for Experiments group, ROOT project), European Organization for Nuclear Research (CERN), Geneva, Switzerland.**  
Detailed achievements:
  - Contributions to RNTuple (the next-generation columnar I/O system for high-energy physics), outperforming HDF5 and Apache Parquet up to a factor of 2.2×. Specifically:
    - A storage backend for the Intel DAOS object store that provides up to ×16 improvement over DAOS dfuse compatibility layer
    - A mechanism to allow for incremental updates of the data schema, a unique feature not present in other columnar storage solutions
    - Further improvements in order to satisfy the requirements of the ATLAS LHC experiment, e.g. per-field post-read hooks and extensions to the type system. Liaison person for ATLAS I/O requirements.
    - Support for big-endian architectures and partial contributions to the design of zero-copy file merge
  - Notable contributions to the cling LLVM-based C++ interpreter, e.g. supporting entity redefinition and general improvements to the unloading infrastructure
  - Supervision of 5+ interns, mentor for CERN-HSF Google Summer of Code, and user training and support
- 2017–2020 ○ **Predoctoral Researcher (Computer Architecture and Technology Area), University Carlos III of Madrid.**  
Detailed achievements:
  - Contributed a prototype implementation of C++ contract-based programming for clang, demonstrating that contracts may make some libstdc++ functions ~ 15% faster
  - Teaching Assistant in Real Time Systems, Operating Systems Design, Operating Systems, and Distributed Systems, achieving an average score of 4.23 out of 5 in the teacher evaluation surveys
  - Held additional office hours on Real Time Systems and Operating Systems Design as part of the UC3M-PIEI International Students Programme 2018–2019
  - July 2018 thesis defense committee member for BSc in Audiovisual System Engineering
  - Advisor in 4 theses (BSc in Computer Science and Engineering)

- 2012–2013 ○ **Associate Engineer (devtools)**, *Tuenti Technologies S.L.*, Madrid.  
Detailed achievements:
- Co-authorship of a program to generate test fixtures based on anonymized real-world data, aiding in improving the test coverage
  - Developed a utility for automated detection of mismatching application backend–database schema, assessing potential deployment issues
  - Contributed a tool to characterize the development environment
- 2006–2011 ○ **System Administrator and Software Developer**, *Grupo Microsyscom*, Madrid.  
Detailed achievements:
- Took the administration of Debian GNU/Linux and FreeBSD, incl. ISC dhcpd, BIND9, Apache httpd, MySQL, and Squid services for 5–10 external clients, ensuring continued service; VPN (IPsec) and VoIP deployment. Incident response.
  - Implemented a RFB connection hub that relays data between a pair of RealVNC endpoints associated to a session identifier, reducing the time to start controlling a remote desktop by at least 5×
  - Contributed to the automated migration from BIND9 to 4PSA DNS Manager

## | Education

- 2017–2020 ○ **Ph.D. in Computer Science and Technology**, *University Carlos III of Madrid*.  
*Dissertation*: “Balancing Performance and Reliability in Software Components”,  
*graduated with honors – Cum laude*  
*Research Stay*: Jul 2019–Oct 2019 at CERN, for the ROOT project (EP/Software for Experiments group)
- 2016–2017 ○ **M.Sc. in Computer Science and Technology**, *University Carlos III of Madrid*.  
*Thesis*: “Automatic Classification of Drivers and Driving Style Using ECU Diagnostic Data”
- 2006–2011 ○ **B.Sc. in Computer Science and Engineering**, *University Carlos III of Madrid*.  
*Thesis*: “fsniff: A software suite for capturing and analyzing application I/O”, graded as passing with honors

## | Selected Publications

### Scientific Journals / Conferences

- **A caching mechanism to exploit object store speed in High Energy Physics analysis**. Cluster Computing (2022).
- **Exploring Object Stores for High-Energy Physics Data Storage**. In 25th International Conference on Computing in High Energy and Nuclear Physics (CHEP 2021).
- **Relaxing the one definition rule in interpreted C++**. In Proceedings of the 29th International Conference on Compiler Construction (CC 2020).
- **Detecting semantic violations of lock-free data structures through C++ contracts**. The Journal of Supercomputing volume 76, pages 5057–5078 (2020).
- **Exploring stream parallel patterns in distributed MPI environments**. Parallel Computing, Volume 84, Issue C, May 2019, pp 24–36.

### Industrial Conferences

- **Adding support for C++ contracts to Clang**. 2019 European LLVM Developers Meeting (EuroLLVM’19).